Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. to 4. (Cancelled)

5. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field applies a periodically varying driving force to the particles;

wherein the mobility-varying field causes the mobility of the particles to vary periodically;

~~A method according to claim 4~~ wherein the driving force and the varying mobility of the particles have a substantially constant phase relationship.

6. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein applying the driving field to the particles in the absence of the mobility-varying field results in no net motion of the particles.

7. to 8. (Cancelled)

9. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-

varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein the correlation is non-zero when computed according to:

$$C_{f(t),g(t)} = \int_{T} f(t)g(t+\lambda)dt$$

where f(t) is the variation in driving force with time, g(t) is the variation in the mobility of the particles with time and λ is a constant time shift, for some value of λ and *T* is the period.

10. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field applies a periodically varying driving force to the particles;

~~A method according to claim 2~~ wherein the driving force varies sinusoidally in time.

11. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein the driving field and mobility-varying fields are both of the same type.

12. to 14. (Cancelled)

15. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying fields are both of the same type;

wherein the driving field comprises a time-varying electric field;

~~A method according to claim 13~~ wherein each of the particles comprises an electrically neutral particle bonded to an electrically charged particle.

16. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner

having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying fields are both of the same type;

wherein the driving field comprises a time-varying electric field;

~~A method according to claim 13~~ wherein the particles have dielectric constants different from that of the medium and the electric field has a time-varying gradient.

17. (Previously presented) A method according to claim 11 wherein the driving field comprises a time-varying magnetic field.

18. to 19. (Cancelled)

20. (Previously presented) A method according to claim 17 wherein the particles have magnetic susceptibilities different from that of the medium and the magnetic field has a time-varying gradient.

21. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

~~A method according to claim 12~~ wherein the driving field comprises a time-varying flow in the medium.

22. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

~~A method according to claim 12~~ wherein the driving field comprises a time-varying density gradient of a species in the medium.

23. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

~~A method according to claim 12~~ wherein the driving field comprises a time-varying gravitational or acceleration field.

24. (Previously presented) A method according to claim 23 comprising accelerating the medium and periodically changing an orientation of the medium relative to a direction of the acceleration.

25. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

~~A method according to claim 12~~ wherein the driving field comprises an acoustic field.

26. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein the particles comprise living organisms.

27. (Cancelled)

28. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field comprises an alternating electric field;

~~A method according to claim 27~~ wherein the velocity of the particles is a non-linear function of applied electric field and the mobility-varying field comprises an electric field having an alternating component transverse to ~~the first~~ a direction of the driving field.

29. (Cancelled)

30. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein applying the mobility-varying field causes changes in a conformation of the particles.

31. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the

medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein applying the mobility-varying field causes changes in a viscosity of the medium.

32. t0 33. (Cancelled)

34. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein applying the mobility-varying field comprises applying an electric field to at least the portion of the medium through which the particles are passing.

35. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein applying the mobility-varying field comprises applying a magnetic field to the medium through which the particles are passing.

36. to 37. (Cancelled)

38. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the

medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

~~A method according to claim 12~~ comprising causing particles to travel in the medium along a surface wherein applying the mobility-varying force alters an interaction between the particles and the surface.

39. to 41. (Cancelled)

42. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

~~A method according to claim 12~~ wherein applying the mobility-varying field comprises causing cyclic chemical changes in the medium.

43. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

~~A method according to claim 12~~ wherein applying the mobility-varying field comprises causing the particles to cyclically bind and unbind to other particles in the medium.

44. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

~~A method according to claim 12~~ wherein applying the mobility-varying field comprises causing the particles to cyclically bind and unbind to a component of the medium.

45. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

~~A method according to claim 12~~ wherein applying the mobility-varying field comprises varying a hydrostatic pressure experienced by the medium.

46. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

~~A method according to claim 12~~ comprising allowing the particles to pass through an area of the medium having a physical dimension on the order of a dimension of the particles wherein applying the mobility-varying field comprises varying the physical dimension of the area of the medium to cause a change in an effective drag experienced by the particles in the area of the medium.

47. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

wherein applying the mobility-varying field comprises changing a temperature of the medium;

~~A method according to claim 32~~ wherein applying the mobility-varying field comprises directing radiation at at least a portion of the medium and allowing the radiation to be absorbed in the medium.

48. to 49. (Cancelled)

50. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

wherein applying the mobility-varying field comprises changing a temperature of the medium;

~~A method according to claim 32~~ wherein the particles have an electromagnetic absorption band and wherein applying the mobility-varying field comprises directing radiation having a wavelength in the electromagnetic absorption band at the particles.

51. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in

type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

wherein applying the mobility-varying field comprises exposing the particles to electromagnetic radiation wherein one or more of an intensity, polarization or wavelength of the radiation varies in time;

~~A method according to claim 33~~ wherein the particles comprise a component that undergoes a reversible change in conformation in response to the radiation.

52. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner

having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

wherein applying the mobility-varying field comprises exposing the particles to electromagnetic radiation wherein one or more of an intensity, polarization or wavelength of the radiation varies in time;

~~A method according to claim 33~~ wherein the particles are bonded to molecules that undergo a reversible change in conformation in response to the radiation.

53. to 54. (Cancelled)

55. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

wherein applying the mobility-varying field comprises exposing the particles to electromagnetic radiation wherein one or more of an intensity, polarization or wavelength of the radiation varies in time;

~~A method according to claim 33~~ wherein applying the electromagnetic radiation causes partial cross-linking of polymers in the medium.

56. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the driving field and mobility-varying field are of different types;

wherein applying the mobility-varying field comprises exposing the particles to electromagnetic radiation wherein one or more of an intensity, polarization or wavelength of the radiation varies in time;

~~A method according to claim 33~~ wherein the radiation directly affects the mobility of the particles in the medium.

57. to 60. (Cancelled)

61. (Original) A method according to claim 42 wherein the chemical changes alter binding of the particles to one another.

62. (Original) A method according to claim 42 wherein the chemical changes alter binding of the particles to other species or structures in the medium.

63. (Original) A method according to claim 42 wherein the chemical changes alter binding of species in the medium to one another.

64. (Original) A method according to claim 42 wherein the chemical changes alter a viscosity of the medium.

65. (Original) A method according to claim 42 comprising causing the chemical changes by applying optical radiation to the medium.

66. to 67. (Cancelled)

68. (Original) A method according to claim 42 comprising inducing the chemical changes by introducing chemical species into the medium.

69. (Original) A method according to claim 42 wherein the chemical changes alter a pH of the medium.

70. (Currently Amended) A method according to claim 35 wherein the medium comprises ferromagnetic particles and applying the magnetic field causes the ~~feromagnetic~~ ferromagnetic particles to be pulled away or into a path of the particles.

71. (Original) A method according to claim 35 wherein applying the magnetic field comprises causing a viscosity of the medium to vary in a two-dimensional pattern.

72. (Original) A method according to claim 71 wherein the medium comprises magnetic particles wherein applying the magnetic field causes the magnetic particles of the medium to aggregate with one another.

73. (Original) A method according to claim 35 wherein applying the magnetic field causes the particles to be drawn toward or moved away from a drag-inducing surface.

74. (Cancelled)

75. (Currently amended) A method according to claim [[74]] 28 wherein applying the electric mobility-varying field causes the particles to be drawn toward or moved away from a drag-inducing surface.

76. (Original) A method according to claim 35 wherein applying the magnetic field causes the particles to aggregate.

77. to 78. (Cancelled)

79. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

wherein the particles comprise biomacromolecules;

~~A method according to claim 77~~ wherein the biomacromolecules are electrically neutral.

80. to 85. (Cancelled)

86. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in

type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein the particles comprise aggregations of molecules.

87. (Original) A method according to claim 86 wherein the aggregations comprise micelles.

88. to 89. (Cancelled)

90. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein the medium comprises a liquid solution of polymers.

91. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein the medium comprises binding sites that bind to the particles.

92. (Cancelled)

93. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in

type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein the medium comprises a microfabricated array of posts.

94. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ comprising allowing the particles to interact with the medium by entropic trapping.

95. to 96. (Cancelled)

97. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein the medium has a three dimensional extent and the method comprises concentrating the particles at a location in the medium by periodically changing a plane of the driving force.

98. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-

varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein the medium comprises a first part and a second part, and the method comprises applying a first mobility-varying field in the first part and a second mobility-varying field in the second part, wherein the driving field and the first mobility-varying field cause particles in the first part to move toward the second part and wherein the driving field and second mobility-varying field cause particles in the second part to move toward the first part.

99. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein applying the driving field and applying the mobility-varying field

comprise applying two independent time-varying electric fields to the medium containing the particles.

100. (Original) A method according to claim 99 wherein, at the particles, the two independent electric fields are not aligned with one another during at least a portion of the period.

101. (Previously presented) A method according to claim 99 wherein the first electric field approximates a dipole field within an area of the medium.

102. (Previously presented) A method according to claim 101 wherein the second electric field approximates a quadrupole field in the area of the medium.

103. (Previously presented) A method according to claim 99 wherein the time variation of the first electric field constitutes a rotation of the first electric field about a location in the area of the medium.

104. (Previously presented) A method according to claim 99 wherein the time variation of the second electric field constitutes a rotation of the second electric field about a location in the area of the medium.

105. (Previously presented) A method according to claim 99 wherein the time variation of the first electric field constitutes a rotation of the first electric field about a location in the area of the medium at a first angular frequency and the time variation of the second electric

field constitutes a rotation of the second electric field about a location in the area of the medium at a second angular frequency, wherein the second angular frequency is twice the first angular frequency.

106. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein the medium constitutes a first medium and the method comprises subsequently extracting the particles from the first medium by an extraction method comprising:

providing a second medium adjoining the first medium at an interface wherein, in the second medium, the particles have velocities that vary substantially linearly with an intensity of an extraction driving field;

for a plurality of extraction periods, in alternation:

for a first part of an extraction period, applying a first extraction driving field directed across the

interface, the first extraction driving field causing the particles in the first medium to move toward the interface by a first distance during the first part of the extraction period;

for a second part of the extraction period, applying a second extraction driving field across the interface, the second extraction driving field having an intensity different from the first extraction driving field and causing the particles in the first medium to move away from the interface by a second distance less than the first distance during the second part of the extraction period;

allowing the particles to cross the interface into the second medium.

107. (Original) A method according to claim 106 comprising allowing the particles to become concentrated in the second medium.

108. (Previously presented) A method according to claim 106 wherein the second medium comprises a buffer solution.

109. (Previously presented) A method according to claim 106 comprising sucking the second medium containing the particles into a transfer device.

110. (Currently amended) A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period;

~~A method according to claim 1~~ wherein the medium constitutes a first medium and the method comprises subsequently extracting the particles from the first medium into a second medium by an extraction method comprising:

during an extraction period applying a time-varying extraction driving field and a time-varying extraction mobility-varying field to the particles, the extraction driving field applying a time-varying extraction driving force to the particles the extraction driving force alternating in direction and directed across the interface;

the extraction mobility-varying field causing a mobility of the particles in the first medium to vary during the period, in a manner having a non-zero correlation with the driving field over the period such that particles in the first medium drift toward the interface with a first net velocity until the particles enter the second medium.

111. (Original) A method according to claim 110 comprising applying the extraction mobility-varying field only to the first medium so that the particles have a net drift velocity

in the second medium that is significantly less than the first drift velocity or zero.

112. (Original) A method according to claim 110 wherein the extraction mobility-varying field does not significantly affect the mobility of the particles in the second medium.

113. to 142 (Cancelled)

143. (Currently amended) Apparatus for concentrating particles, the apparatus comprising:

a body of a medium in which the particles are mobile;

a first field source coupled to deliver a time-varying driving field to the medium the driving field capable of applying a time-varying driving force alternating in direction to particles in the medium; and,

a second field source coupled to deliver a time-varying mobility-varying field to the medium, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field; and,

a control system configured to apply the driving field and mobility-varying field simultaneously to at least a portion of the medium during a period;

~~Apparatus according to claim 141~~ comprising an extended electrode maintained at a substantially constant potential on either side of the thin layer.

144. to 145. (Cancelled)

146. (Currently amended) Apparatus for concentrating particles, the apparatus comprising:

a body of a medium in which the particles are mobile;

a first field source coupled to deliver a time-varying driving field to the medium the driving field capable of applying a time-varying driving force alternating in direction to particles in the medium; and,

a second field source coupled to deliver a time-varying mobility-varying field to the medium, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field; and,

a control system configured to apply the driving field and mobility-varying field simultaneously to at least a portion of the medium during a period;

~~Apparatus according to claim 141~~ wherein the medium comprises binding sites that selectively bind to the particles.

147. (Original) Apparatus according to claim 146 wherein the selective binding sites comprise sequences of nucleic acids that are complementary to nucleic acid sequences occurring in the particles.

148. (Currently amended) Apparatus for concentrating particles, the apparatus comprising:

a body of a medium in which the particles are mobile;

a first field source coupled to deliver a time-varying driving field to the medium the driving field capable of applying a time-varying driving force alternating in direction to particles in the medium; and,

a second field source coupled to deliver a time-varying mobility-varying field to the medium, the mobility-varying

field being one or both of: different in type from the driving field, and non-aligned with the driving field; and,

a control system configured to apply the driving field and mobility-varying field simultaneously to at least a portion of the medium during a period;

~~Apparatus according to claim 141~~ wherein the first field source comprises three or more non-collinear electrodes and a power supply controlled by the control system to apply a sequence of voltage patterns to the electrodes.

149. (Cancelled)

150. (Currently amended) Apparatus for concentrating particles, the apparatus comprising:

a body of a medium in which the particles are mobile;

a first field source coupled to deliver a time-varying driving field to the medium the driving field capable of applying a time-varying driving force alternating in direction to particles in the medium; and,

a second field source coupled to deliver a time-varying mobility-varying field to the medium, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field; and,

a control system configured to apply the driving field and mobility-varying field simultaneously to at least a portion of the medium during a period;

~~Apparatus according to claim 141~~ wherein the second field source comprises a source of a magnetic field.

151. (Cancelled)

152. (Currently amended) Apparatus for concentrating particles, the apparatus comprising:

a body of a medium in which the particles are mobile;

a first field source coupled to deliver a time-varying driving field to the medium the driving field capable of applying a time-varying driving force alternating in direction to particles in the medium; and,

a second field source coupled to deliver a time-varying mobility-varying field to the medium, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field; and,

a control system configured to apply the driving field and mobility-varying field simultaneously to at least a portion of the medium during a period;

wherein the second field source comprises a source of electromagnetic radiation;

~~Apparatus according to claim 151~~ wherein the source of electromagnetic radiation comprises a source of light.

153. (Original) Apparatus according to claim 152 wherein the source of light is configured to illuminate the medium with a pattern of alternating lighter and darker areas.

154. to 161. (Cancelled)

162. (Currently amended) Apparatus for concentrating particles, the apparatus comprising:

a body of a medium in which the particles are mobile;

a first field source coupled to deliver a time-varying driving field to the medium the driving field capable of

applying a time-varying driving force alternating in direction to particles in the medium; and,

a second field source coupled to deliver a time-varying mobility-varying field to the medium, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field; and,

a control system configured to apply the driving field and mobility-varying field simultaneously to at least a portion of the medium during a period;

~~Apparatus according to claim 141~~ wherein the second field source comprises a source of an acoustic field.

163. (Cancelled)

164. (Currently amended) Apparatus for concentrating particles, the apparatus comprising:

a body of a medium in which the particles are mobile;

a first field source coupled to deliver a time-varying driving field to the medium the driving field capable of applying a time-varying driving force alternating in direction to particles in the medium; and,

a second field source coupled to deliver a time-varying mobility-varying field to the medium, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field; and,

a control system configured to apply the driving field and mobility-varying field simultaneously to at least a portion of the medium during a period;

wherein the second filed source comprises a reservoir of a solvent and a means for applying the solvent to the medium in a time-varying manner;

~~Apparatus according to claim 163~~ wherein the medium is enclosed in a chamber and the apparatus comprises a means for reducing a pressure within the chamber.

165. (Currently amended) Apparatus for concentrating particles, the apparatus comprising:

a body of a medium in which the particles are mobile;

a first field source coupled to deliver a time-varying driving field to the medium the driving field capable of applying a time-varying driving force alternating in direction to particles in the medium; and,

a second field source coupled to deliver a time-varying mobility-varying field to the medium, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field; and,

a control system configured to apply the driving field and mobility-varying field simultaneously to at least a portion of the medium during a period;

~~Apparatus according to claim 141~~ comprising a cooler in thermal contact with the medium.

166. to 184. (Cancelled)

185. (Previously presented) A method according to claim 21 wherein the mobility-varying field comprises an electrical field.

186. (Previously presented) A method according to claim 185 wherein the time-varying flow varies spatially and the electrical mobility-varying field alters effective

mobilities of charged particles by moving the charged particles between regions having different rates of flow.

187. (New) A method according to claim 91 wherein the binding sites comprise sequences of nucleic acids that are complementary to nucleic acid sequences occurring in the particles.

188. (New) A method according to claim 187 wherein the medium comprises a gel and the sequences of nucleic acids comprise DNA oligonucleotides that are covalently bonded to the gel.

189. (New) A method according to claim 187 wherein applying the mobility-varying field comprises changing a temperature of the medium.

190. (New) A method according to claim 189 wherein the driving field comprises a time-varying electric field.

191. (New) A method according to claim 190 wherein applying the driving field comprises applying electrical potentials to three or more non-collinear electrodes.

192. (New) A method according to claim 190 comprising changing a vector direction of the electric field.

193. (New) A method according to claim 192 comprising rotating a direction of the electric field.

194. (New) A method according to claim 192 comprising concentrating the particles at a location in the medium.